

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (original) A bipolar transistor, comprising:
a substrate having a collector region of a first conductivity type;
a base layer of a single crystalline structure and including impurities of a second conductivity type located over the collector region;
an emitter region defined at least in part by impurities of the first conductivity type contained in the base layer; and
an emitter electrode of the first conductivity type contacting the emitter region, wherein at least a portion of the emitter electrode which is in contact with the emitter region has a single crystalline structure.
2. (original) The bipolar transistor of claim 1, further comprising a base electrode located over the base region.
3. (original) The bipolar transistor of claim 2, wherein the base electrode comprises at least one of polysilicon and polysilicon-germanium.
4. (original) The bipolar transistor of claim 1, further comprising a metal layer formed on the emitter electrode.
5. (original) The bipolar transistor of claim 4, wherein at least of portion of the emitter electrode in contact with the metal layer has a single crystalline structure.

6. (original) The bipolar transistor of claim 1, further comprising a metal layer formed on the base layer.

7. (original) The bipolar transistor of claim 2, further comprising a metal layer formed on the base electrode.

8. (original) The bipolar transistor of claim 4, wherein the metal layer is a silicide layer, and wherein the bipolar transistor further comprising a metal electrode layer contacting the silicide layer.

9. (original) The bipolar transistor of claim 1, wherein at least a portion of the emitter electrode not in contact with the emitter region has a polycrystalline or amorphous structure.

10. (original) The bipolar transistor of claim 1, wherein an entirety of the emitter electrode has a single crystalline structure.

11. (original) The bipolar transistor of claim 4, wherein at least a portion of the emitter electrode in contact with the metal layer has a polycrystalline or amorphous structure.

12. (original) The bipolar transistor of claim 1, wherein an impurity concentration of the emitter electrode varies in a depth direction.

13. (original) The bipolar transistor of claim 12, wherein an upper portion of the emitter electrode has a higher impurity concentration than a lower portion of the emitter electrode.

14. (original) The bipolar transistor of claim 1, wherein the emitter electrode comprises one of Si, SiGe or a composite of Si and SiGe.

15. (original) The bipolar transistor of claim 1, further comprising a base region located in a surface of the collector region and below the base layer.

16. (original) The bipolar transistor of claim 2, further comprising a sidewall spacer which electrically insulates the emitter electrode from the base electrode.

17. (original) A bipolar transistor, comprising:
a substrate having a collector region of a first conductivity type;
a base region of a single crystalline structure and of a second conductivity type located over the collector region;
an emitter region defined at least in part by impurities of the first conductivity type contained in the base layer; and
an emitter electrode comprising an epitaxially grown layer of the first conductivity type contacting the emitter region.

18. (original) The bipolar transistor of claim 17, wherein the epitaxially grown layer was grown at a temperature of less than 900°C.

19. (original) The bipolar transistor of claim 17, further comprising a silicide layer formed on the epitaxially grown layer of the emitter electrode, and a metal electrode layer formed on the silicide layer.

20. (original) The bipolar transistor of claim 19, further comprising a metal electrode layer formed on the epitaxially grown layer of the emitter electrode.

21. (original) The bipolar transistor of claim 17, wherein the emitter electrode further comprises a polycrystalline grown layer formed over the epitaxially grown layer.

22. (original) The bipolar transistor of claim 21, wherein an interface between the epitaxially grown layer and the polycrystalline grown layer is structurally characterized by both layers being continuously grown in the absence of a vacuum break.

23. (original) The bipolar transistor of claim 22, wherein a structural transition from the epitaxially grown layer to polycrystalline grown layer of the emitter electrode is gradual.

24. (original) The bipolar transistor of claim 23, further comprising a silicide layer formed on the polycrystalline grown layer of the emitter electrode, and a metal electrode layer formed on the silicide layer.

25. (original) The bipolar transistor of claim 24, further comprising a metal electrode layer formed on the polycrystalline grown layer of the emitter electrode.

26. (original) The bipolar transistor of claim 17, wherein the emitter electrode further comprises an amorphous layer formed over the epitaxial layer.

27. (original) The bipolar transistor of claim 17, further comprising an insulating layer formed on the substrate and having a through hole aligned over the emitter region, wherein the epitaxial layer is at least partially contained in the through hole.

28. (original) The bipolar transistor of claim 27, wherein the epitaxial layer extends over a top surface of the insulating layer.

29. (original) The bipolar transistor of claim 17, wherein the epitaxially grown layer comprises one of Si, SiGe or a composite of Si and SiGe.

30. (original) The bipolar transistor of claim 21, wherein the epitaxially grown layer and the polycrystalline grown layer comprise one of Si, SiGe or a composite of Si and SiGe.

31 – 55 (cancelled).